

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 26.

August, 1924.

No. 308.

A STUDY OF THE GENUS ZIZANIA.

NORMAN C. FASSETT.

IN attempting to place some unusual specimens of *Zizania* collected in the summer of 1923 near the city of Quebec, the writer found it difficult to determine to his satisfaction the precise difference between *Z. palustris* and *Z. aquatica* as defined by Professor A. S. Hitchcock in the seventh edition of Gray's Manual. Examination of the spikelets, however, showed that there was a distinct difference, apparently recently overlooked, in the texture of the pistillate lemmas; those of the northern narrow-leaved form (*Z. aquatica* of the Manual) are firm and tough, while those of the southern broad-leaved form (*Z. palustris* of the Manual) are thin and papery. This character, combined with the greater height, wider leaves, and more luxuriant inflorescence of the southern form, would appear sufficient for specific distinction, were it not for the fact that in the Middle West there is a grass which combines the characters of these two, having the large vegetative growth of the southern plant, and the firm lemma of the northern one.

The *Zizania palustris* of Hitchcock's treatments was known as *Z. aquatica* until 1908, when he applied the latter name to the small plant of the North. Linnaeus had based *Z. aquatica* upon Gronovius's *Zizania* of the Flora Virginica, page 189, and upon *Arundo alta gracilis, foliis viridi caeruleis, locustis minoribus*, Sloan. Hist. Jamaica, page 110, plate 67. The plant of Gronovius was undoubtedly the broad-leaved one, as the narrow-leaved plant is not found south of New

England; no *Zizania* occurs in Jamaica, and Sloane's plant is probably *Phragmites communis* (L.) Trin. *Z. aquatica* of the Species Plantarum should be taken, then, as based upon *Zizania* of Gronovius, and the name of the genus itself was taken, of course, directly from Gronovius.

Professor Hitchcock states¹ that the two specimens of *Zizania* in the Linnean herbarium are the narrow-leaved form, one of which is marked "1 aquatica," and the other "Zizania HU," each in Linnaeus's hand. Here arises a difficult nomenclatorial question. Linnaeus's reference in the Species Plantarum (i. e., Gronovius) obviously belongs to one plant, and his specimen ("1 aquatica") to another.² Hitchcock solved this problem by applying the later-defined name, *Z. palustris* L.,³ to the broad-leaved plant, thus reserving *Z. aquatica* for the narrow-leaved one which was represented by a specimen in the Linnean herbarium, saying, "The fact that later he [Linnaeus] described the broad-leaved form as a distinct species confirms the opinion that his idea of *Z. aquatica* was the narrow-leaved species." But was *Z. palustris* the broad-leaved species, as Hitchcock stated? The description of this species starts, "Culmis bipedalis;" the broad-leaved species to which Hitchcock referred this name is commonly from two to three meters high, while the narrow-leaved plant seldom exceeds a meter in height. "*Gluma calycina diphylla rigidula*" applies to the firm lemmas of the narrow-leaved plant much better than to the papery lemmas of the broad-leaved one. "Folia . . . *arundinaria phragmitis latiora*," upon which Hitchcock based his decision, loses some of its force when we note that the leaves of the European *Phragmites communis*, which Linnaeus doubtless had in mind, are in general narrower than those of the plant with which we are familiar in America.

Zizania palustris was definitely described from the Hortus Upsaliensis ("H. U."), and there is a sheet marked "HU" in the Linnean herbarium, which is, according to Hitchcock, the narrow-leaved plant, and it is fairly evident that it was from material of which this sheet is representative that Linnaeus made the description of that species. Schreber, one year after the description of *Z. palustris*, gave a full discussion of this plant, which he states had only recently

¹ Contrib. U. S. Nat. Herb. xii. Pt. 3: 124 (1908).

² It is interesting in this connection to note Mr. F. V. Coville's preface to Professor Hitchcock's work, in which he states as a principle that in such cases the Linnean reference rather than the specimen marked by Linnaeus should determine the application of a name.

³ Mant. 295 (1771).

been grown in the Upsala gardens,¹ and his colored plate represents the small plant, not only in size of plant and width of leaf, but in the character of the pistillate lemma, which is plainly shown. Col. Monro, in his identification of the grasses in the Linnean herbarium,² says, "I. *Z. aquatica*, L.! The plant so named is the small state which I believe Linnaeus, in his Mant. p. 295, intended to indicate by *palustris*, of which form there is also a specimen from Upsal Garden, marked '*palustris*' by Sm." There can be no doubt, then, that *Z. palustris* is the small narrow-leaved plant.

The sheet marked "1 *aquatica*" was in the Linnean herbarium in 1753,³ but Linnaeus drew no description from this specimen, nor did he quote any locality in addition to those given by Gronovius and Sloane. He identified the specimen in his herbarium with the Gronovian plant, apparently after the publication of *Z. aquatica*. Later he segregated the narrow-leaved plant as *Z. palustris*, leaving the name *Z. aquatica* for the tall broad-leaved plant of the more southern range, which was its original application.

ZIZANIA L. Gen. Pl. ed. 5: 427 (1754). Monoecious grasses, the upper part of the inflorescence pistillate, the lower staminate: glumes obsolete, represented in the pistillate spikelets by minute cupules below the lemmas: pistillate lemma usually long-awned, closely embracing the grain, clasping the palea by its inrolled margins, scabrous at least on the nerves and awn; staminate lemma and palea sub-equal, lemma sometimes short-awned: grain long-cylindrical, black: stamens six. Type species *Z. aquatica*.

- a. Plants without creeping rootstocks: staminate branches of the inflorescence invariably lacking pistillate flowers; pedicels of the pistillate spikelets coarse and clavate, those of the staminate capillary *b*.
- b. Pistillate lemmas thin and papery, dull, finely striate, scabrous over the whole surface;⁴ the aborted spikelets slender and shriveled, less than 1 mm. thick *c*.
- c. Plant (0.8-) 1.2-3 m. tall: leaves (0.8-) 1-5 cm. broad; ligules (0.6-) 1-2 (-2.5) cm. long: awn of the pistillate lemma (1.5-) 2-7 cm. long.....*Z. aquatica*.

¹ Schreber, Beschreibung der Gräser, ii. 55 (1772). "In Betrachtung dessen würde es vielleicht nützlich sein, dieses Gewächs, welches in dem königlichen französischen Garten zu Trianan schon seit geraumer Zeit cultivirt wird, in dem akademischen botanischen Garten zu Upsal neuerlich fortgekommen ist, und auch in den meisten Gegenden von Teutschland ohnfehlbar fortkommen würde, einheimisch zu machen."

² Monro, Journ. Linn. Soc. vi. 51 (1862).

³ Jackson, B. D. Proc. Linn. Soc. London, 124th session, 152 (1912).

⁴ This character is best seen with the binocular microscope.

- c. Plant 4-5.5 dm. tall: leaves 3-12 mm. broad; ligules 3 mm. long: awn of the pistillate lemma 1-8 mm. long. . . . var. *brevis*.
- b. Pistillate lemmas firm and tough, with lustrous coarsely corrugate surface, scabrous on the margins, at the summit and along the awn, and sometimes along the nerves, otherwise glabrous: the aborted spikelets with distinct body 1.5-2 mm. thick *d*.
- d. Plant 0.7-1.5 m. tall: leaves 4-10 (-14) mm. broad; ligules 3-5 (-10) mm. long: lower pistillate branches with 2-6 spikelets; lower or middle staminate branches with 5-15 spikelets. var. *angustifolia*.
- d. Plant 0.9-3 m. tall: leaves 1-3 cm. broad; ligules 1-1.5 cm. long: lower pistillate branches with 11-29 spikelets; lower or middle staminate branches with (20-) 30-60 spikelets. var. *interior*.
- a. Plant perennial, with creeping rootstocks: uppermost staminate branches of the inflorescence terminated by pistillate spikelets: pedicels of the staminate and the pistillate spikelets of nearly the same diameter. *Z. latifolia*.

1. *ZIZANIA AQUATICA* L. Sp. Pl. ii. 991 (1753); Lamb. Linn. Trans. vii. 264, t. 13 (1804);¹ Nutt. Gen. N. Am. Pl. ii. 210 (1818); Elliott, Sketch of Bot. of S. C. & Ga. ii. 585 (1824); Chapman, Fl. Southern U. S. 549 (1860); Bentham, Journ. Linn. Soc. xix. 54 (1881) in part; Rendle, Journ. Linn. Soc. xxxvi. 345 (1904) in part; not Willd. Sp. Pl. iv. 394 (1805); nor Link, En. Pl. ii. 391 (1822); nor Hitchcock, Contrib. U. S. Nat. Herb. xii. Pt. 3: 124 (1908) and in Gray, Manual, ed. 7: 120 (1908). *Z. clavulosa* Michx. Fl. Bor.-Am. i. 75 (1803); Willd. Sp. Pl. iv. 394 (1805). *Hydropyrum esculentum* Link, Hort. Berol. i. 252 (1827) in part; Kunth, Enum. i. 9 (1833) in part, and Suppl. 7, t. 1, fig. 1 (1835). *Z. effusa* Herb. L. ex Monro, Journ. Linn. Soc. vi. 52 (1862). *Z. palustris* Hitchcock, Contrib. U. S. Nat. Herb. xii. Pt. 3: 124 (1908) and in Gray, Manual, ed. 7: 120 (1908); not L. Mant. 295 (1771).—Mouths of rivers and in brackish places, along the Atlantic coast of North America from southern Maine to western Florida and probably Louisiana, inland in northern New York, and rarely in Michigan.

The following representative specimens may be cited:² MAINE: Woolwich, Sept. 15, 1916, *Fernald & Long*, no. 12581; Bowdoinham, Sept. 14 and 19, 1916, *Fernald & Long*, no. 12580. MASSACHUSETTS: Newbury, July 21, 1913, *D. White*, no. 214; Harwich, Aug. 7, 1919, *Fernald & Long*, no. 17904. NEW YORK: Woodville, June 23, 1921, *H. D. House*, no. 8217; Hammond, July 28, 1915, *O. P. Phelps*, no. 1371; Ithaca, Aug. 12, 1916, *F. P. Metcalf*, no. 5581; Glenmont, Sept. 12, 1917, *H. D. House*; Sandy Creek Township, Aug. 25, 1922, *Fernald, Wiegand, & Eames*, no. 14161. NEW JERSEY: Point Pleasant,

¹ The plate illustrates the broad-leaved plant. Lambert states on the authority of Smith that Linnaeus described it originally as *Z. aquatica*, but later called it *Z. palustris*, reserving the former name for Sloane's plant (which is *Phragmites communis*).

² Specimens in the Gray Herbarium and Herbarium of the New England Botanical Club unless otherwise noted.

Sept. 8, 1917, *A. Gershoy*, no. 78. DISTRICT OF COLUMBIA: Washington, Aug. 14, 1905, *Agnes Chase*, Kneucker's Gramineae Exsiccatae, no. 560; Eastern Branch, July, 1900, *E. D. Merrill*, no. 171. VIRGINIA: Carter's Wharf, Aug. 27, 1915, *I. Tidestrom*, no. 7729; Port Royal, Aug. 26, 1915, *I. Tidestrom*. FLORIDA: Duval Co., *A. H. Curtiss*, no. 3364 (there are two sheets under this number in the Gray Herbarium: one is typical *Z. aquatica*; the other has the pistillate lemmas partially glabrous, but still of sufficiently thin texture to warrant referring it here). ONTARIO: Pelee Island, Aug. 21, 1915, *MacDaniels & Eames*. MICHIGAN: New Buffalo, July 20, 1911, *O. E. Lansing, Jr.*, no. 3279.

1a. *Z. AQUATICA*, var. **brevis**, n. var., culmis 2–6.5 dm. altis solitariis vel subcaespitosis; foliis substrictis 6–18 cm. longis 3–9 (–11) mm. latis, ligulis 3 mm. longis; lemmatibus femineis 5–8 mm. longis chartaceis scabratis, aristis 1–8 mm. longis.

Culms 2–6.5 dm. tall, solitary or subcaespitose: leaves ascending, 6–18 cm. long, 3–9 (–11) mm. broad; ligules 3 mm. long: pistillate lemmas 5–8 mm. long, of thin papery texture, scabrous over the whole surface; awns 1–8 mm. long.—Tidal flats of the St. Lawrence River about Quebec. PROVINCE OF QUEBEC: St. Lawrence River above the city of Quebec, Sept., 1912, *M. O. Malte*; rocky tidal flats, Levis, Aug. 9, 1923, *Svenson & Fassett*, no. 853 (TYPE in Gray Herb.); rocky tidal flats, St. Augustin, Aug. 7, 1923, *Svenson & Fassett*, no. 854; Ste. Anne de Beaupré, Aug. 30, 1905, *John Macoun*, no. 68989; grèves intercotidales de Beauport, Aug. 8, 1922, *Bro. Victorin*, no. 15230. ONTARIO: Casselmann, *John Macoun*, no. 85842, approaches this variety, but has awns 1–1.5 cm. in length.

1b. *Z. AQUATICA*, var. **ANGUSTIFOLIA** Hitchcock, RHODORA, viii. 210 (1906). *Z. palustris* L. Mant. 295 (1771); Schreber, Beschreibung der Gräser, ii. 54. t. 29 (1772); Willd. Sp. Pl. iv. 395 (1805); not Rasp. Ann. Sci. Nat., Sér. I. v. 452 (1825); nor Hitchcock, Contrib. U. S. Nat. Herb. xii. Pt. 3: 124 (1908) and in Gray, Manual, ed. 7: 120 (1908). *Hydropyrum esculentum* Link, Hort. Berol. i. 252 (1827) in part; Kunth, Enum. i. 9 (1833) in part, not Suppl. 7, t. 1 (1835). *Melinum palustre* Link, Handb. i. 96 (1829). *Z. aquatica* Hitchcock, Contrib. U. S. Nat. Herb. xii. Pt. 3: 124 (1908) and in Gray, Manual, ed. 7: 120 (1908); not L. Sp. Pl. 991 (1753).—Eastern New Brunswick to central New York and eastern Ontario; northern Indiana. Type from Belgrade, Maine, Aug., 1895, *F. L. Scribner*.

The following specimens are typical: NEW BRUNSWICK: Lakeside, Aug. 25, 1923, *Svenson & Fassett*, no. 855; Westfield, Aug. 6, 1909, *M. L. Fernald*, no. 1285. MAINE: Calais, Aug. 3, 1909, *M. L. Fernald*, no. 1284; Milford, Aug. 15, 1916, *Fernald & Long*, no. 12579; Manchester, Aug., 1915, *F. L. Scribner*. VERMONT: Burlington, Aug. 5, 1921, *C. H. Knowlton*; Hubbardton, July 31, 1915, *Eames & Godfrey*, no. 9070. MASSACHUSETTS: Pepperell, Aug. 14, 1909, *L. W. Riddle* (in Herb. Wellesley College). NEW YORK: Plattsburg, Am.

Gr. Nat. Herb. no. 435; DeKalb, Aug. 8, 1914, *O. P. Phelps*, no. 172; Selkirk, Oswego Co., Aug. 24, 1922, *Fernald, Wiegand, & Eames*, no. 14160. PROVINCE OF QUEBEC: Ste. Angele de Lavel, Nicolet Co., July 31, 1923, *Chamberlain & Knowlton*. ONTARIO: Russell, July 22, 1911, *John Macoun*, no. 85843; Ottawa, Sept. 16, 1912, *F. Fyles*; Ottawa, Aug. 8, 1894, *John Macoun*, no. 7506. INDIANA: Miller, Aug. 20, 1913, *H. H. Smith*, no. 5772.

1c. *Z. AQUATICA*, var. **interior**, n. var., culmis 0.9–3 m. altis; foliis 2–8 dm. longis 1–3 cm. latis, ligulis 1–1.5 cm. longis; ramis femineis luxuriosissimis cum 11–29 spiculis, ramis masculis luxuriosissimis cum (20–)30–60 spiculis (hic *Z. aquaticam* simulantibus); lemmatibus femineis firmis nitentibus glabratis praeter margines nervosque et aristas (hic var. *angustifoliam* simulantibus).

Culms 0.9–3 m. tall: leaves 2–8 dm. long, 1–3 cm. broad; ligules 1–1.5 cm. long: lower pistillate branches with 11–29 spikelets; middle or lower staminate branches with (20–)30–60 spikelets (in these characters simulating typical *Z. aquatica*): pistillate lemmas firm, shining, glabrous except on the margins, nerves, and awns (in this character simulating var. *angustifolia*).¹—*Z. aquatica* Lapham, Trans. Wisc. State Agri. Soc. iii. 419, pl. ii. (1854).—Lake Michigan to North Dakota and Nebraska; Texas. INDIANA: Wolf Lake, Aug. 8, 1920, *D. C. Peattie*. ILLINOIS: Bluff Lake, Union Co., Aug. 17, 1881, *A. B. Seymour* (in Herb. Wellesley College). MINNESOTA: Lake City, Aug. 20, 1883, *W. H. Manning*. WISCONSIN: Brown Co., June, 1885, *J. H. Schuette*. IOWA: Ogden, Aug. 20, 1898, *L. H. Pammel*, no. 2147; Armstrong, Aug. 27, 1897, *Pammel & Cratty*, no. 764 (TYPE in Gray Herb.). NEBRASKA: Whitman, July 31, 1893, *P. A. Rydberg*, no. 1630; Kennedy, Aug. 27, 1910, *J. M. Bates*. TEXAS: (no locality given) 1886–9, *G. C. Nealley*.

2. *Z. LATIFOLIA* Turcz. Bull. Soc. Nat. Mosc. 1838, no. 1: 105 (1838), and Cat. Baical.-Dahur. 21 (1838); Stapf, Kew Bull. 1909; 385 (1909). *Hydropyrum latifolium* Griseb. in Ledeb. Fl. Ros. iv. 466 (1853); Turcz. Bull. Soc. Nat. Mosc. xxix. Pt. 1: 2 (1856) and Fl. Baical.-Dahur. ii. Pt. 1: 289 (1856); Maxim. Primitiae Fl. Amur. 327 (1859); Regel, Tent. Fl. Ussuriensis, 171 (1861); Miq. Prol. Fl. Jap. 160 (1867); Franch. & Sav. Enum. Pl. Jap. ii. 156 (1879). *Z. dahurica* Turcz. ex Steud. Syn. Pl. Gram. 4 (1854). *Z. palustris* Siebold, Syn. Pl. Econ. 10 (1830). *Limnochloa cauduciflora* Turcz. in Trin. Mém. de l'Acad. de St. Pétersb. Sér. VI. v. Bot. 185 (1840), Reprint 19 (1839). *Z. aquatica* Benth. Journ. Linn. Soc. xix. 54 (1881) in part; Henry, Trans. Asiat. Soc. Jap. xxiv. Suppl. 107 (1896); Hackel, Bull. Herb. Boiss. ser. 1, vii. 646 (1899) and ser. 2, iii. 502

¹See Brown & Scofield, Bull. no. 50 of the Bur. Pl. Ind. (1903). Plate V of this bulletin shows this plant and typical *Z. aquatica*. The difference in spread of the panicle of the two phases, here stressed, is not constant in the collection at the Gray Herbarium, but in this plate the spikelets of the plant in Fig. 2 may be seen to be decidedly thicker than in that of Fig. 1. Plate IV, Fig. 1, and Plate VII, C, show the spikelets of var. *interior*.

(1903); Rendle, Journ. Linn. Soc. xxxvi. 345 (1904) in part; Matsu-mura, Index Pl. Jap. ii. 87 (1905); Nakai, Fl. Kor. ii. 352 (1911); not L. *Z. aquatica*, var. *latifolia* Komarov, Fl. Manshur. i. 261 (1901).—Eastern Siberia, China and Japan. There is a full discussion of this species by Stapf, l. c. *Z. latifolia* as published by Turczaninow was a *nomen nudum*, but Stapf took up this name in 1909, thus validating it.

EXCLUDED NAMES AND SPECIES.

Z. aquatica Willd. Sp. Pl. iv. 394 (1803) = PHRAGMITES COMMUNIS (L.) Trin. The author excludes the Gronovian plant, and gives the only habitat as Jamaica.

Z. aquatica Link, En. Pl. ii. 391 (1822) = PHRAGMITES COMMUNIS (L.) Trin.

Zizania ? *aristata* Kunth, Rev. Gram. i. 8 (1829) = HYGRORYZA ARISTATA Nees.

Z. bonariensis Balansa & Poitrass, Bull. Soc. Hist. Nat. Toul. xii. 228 (1878) = ZIZANIOPSIS BONARIENSIS Speg.

Z. ciliata Spreng. Syst. Veget. ii. 136 (1825) = LEERSIA HEXANDRAS Sw.

Z. fluitans Michx. Fl. Bor.-Am. i. 75 (1803) = HYDROCHLOA FLUITANS Nash.

Z. lenticularis Michx. ex Steud. Nom. 898 (1821) is a *nomen nudum*, published without description or reference.

Z. microstachya Nees, ex Trin. in Mém. Acad. Pétersb. Sér. VI. v. Sc. Nat. ii. 183 (1839), Reprint 17. = ZIZANIOPSIS MICROSTACHYA Doell.

Z. miliacea Michx. Fl. Bor.-Am. i. 74 (1803) = ZIZANIOPSIS MILIA-CEA Doell. & Aschers.

Z. natans Bosc ex Trin. in Mém. Acad. Pétersb. Sér. VI. v. Sci. Nat. ii. 186 (1839), Reprint, 20. = HYDROCHLOA CAROLINENSIS Beauv.

Z. nutans Steud. Nom. ed. II. ii. 799 (1841) = HYDROCHLOA CAROLINENSIS Beauv.

Z. palustris Rasp. Ann. Sci. Nat., Sér. I. v. 452 (1825) = COLEANTHUS SUBTILIS Roem. & Schult.

Z. Retzii Spreng. Syst. Veget. ii. 136 (1825) = HYGRORYZA ARISTATA Nees.

Z. subtilis Rasp. l. c. 458 = COLEANTHUS SUBTILIS Roem. & Schult.

Z. terrestris L. Sp. Pl. 991 (1753) = SCLERIA **terrestris** (L.) n. comb. *Zizania terrestris* L. Sp. Pl. 991 (1753); Willd. Sp. Pl. iv. 396 (1805). *Scleria elata* Thwaites, Enum. Pl. Zeylandie, 353 (1864); Böck. Linnaea, xxxviii. 487 (1874); Clarke in Hooker, Fl. Brit. Ind. vi. 690 (1894); Trimen, Fl. Ceylon, v. 97 (1900); Ridley, materials for a Flora of the Malayan Peninsula, iii. 114 (1907).

Linnaeus based *Zizania terrestris* on the *Katou-Tfjolam* of the Hortus Malabarensis, which has a good plate illustrating clearly the

plant known as *Scleria elata*, so this combination becomes necessary under the International Rules. There are apparently two well-marked varieties of this species. *S. TERRESTRIS*, var. **latior** (Clarke) n. comb. *S. elata*, var. *latior* Clarke in Hooker, Fl. Br. Ind. vi. 690 (1894). *S. TERRESTRIS*, var. **decolorans** (Clarke) n. comb. *S. elata*, var. *decolorans* Clarke l. c.

GRADUATE SCHOOL OF ARTS AND SCIENCES, *Harvard University*.

FURTHER NOTES ON BRITISH COLUMBIA ALGAE.

WM. RANDOLPH TAYLOR.

IN 1921 the writer made a camping trip through portions of the mountains of British Columbia with Dr. M. H. Jacobs, collecting algae and bryophytes as much as possible.¹ During the past season under the same leader he was able to visit other portions of this territory and to secure further collections. The party entered the Selkirk Mountains from Golden, B. C., in late August and traversed successively parts of Cañon Creek, the Spillamacheen River, Grizzly Creek and the Beaver River, passing between the first three by passes in which branches of these streams had their sources. Camps were made at various points on the North Fork of Cañon Creek giving opportunity to visit several snow fields and small glaciers feeding this stream, and to visit that fork of Grizzly Creek which headed up with the North Fork. This is an entirely different Cañon Creek from that visited in 1921 near Revelstoke. From a camp on the Spillamacheen a visit was paid to Prairie Mountain, which lies between the upper part of that stream and the Beaver River. This is a long grassy ridge, comparatively low, (6-7000 feet) with a few streams and springs which proved particularly rich. The party finally left this portion of the country at Connaught on the Canadian Pacific Railroad. A short trip was also made up the Yoho Valley at Field and another in the neighborhood of Lake Louise in Alberta, but little collecting was done on these trips. Material was secured under much the same difficulties as on the previous trip and cared for in the same way.

Instead of the rigorous weather conditions of 1921 the party in 1923 was favored with clear skies and a warm sun, so that the pools in the

¹Taylor, W. R. Notes on some algae from British Columbia. RHODORA 24: 101-111. 1922.